last years, currently evolving into more complex procedures with increasing image cuality requirement which results in substantial patient (p) radiation doses due to prolonged fluoroscopy time and radiographic exposure.

Methods: To evaluate this fact, we analysed doses exposure in 1030 consecutive p undergoing interventional cardiology procedures in our cardiac catheterization laboratory. Procedures were divided into three groups: diagnostic angiography (DA) 583 p (56.6%), percutaneous coronary intervention (PCI) 427 p (41.5%) and structural heart intervention (SHI) 20 p (1.9%). These procedures were consecutively performed by five skilled interventional cardiologist (IC) using three x-ray equipments (Allura XperFD10, Philips®). Variables related to the complexity of procedure were analysed. X-ray equipments were calibrated using the same protocol. Dose–area product (DAP) and air kerma–area product were measured in all the p. Skin dose (SD) was calculated from the measured DAP adjusted for a correction factor derived during calibration and applying a factor that takes into account the backscatter of the patient.

Results: In 3,3% of the patients, the SD exceeded the 3 Gy dose threshold for deterministic effects (DA: 0,2%; PCI: 6,58%; SHI: 7,1%). Interventional cardiology procedures with the highest SD registered were: SHI-fistula closure (3044,52 mGy), chronic total occlusion PCI (2681,26 mGy), SHI-TAVI (2102,92 mGy) and SHI-Left atrial appendage closure (1772,90 mGy). We did not find significant differences according to IC after adjunting by procedure caracteristics. Sex and number of stents were variables related to SD, being Fluoro time the most closely related to SD ($R2=0,69$; $p<0,001$) with an effect coefficient b=75,38 mGy/min.

Conclusion: High radiation doses to p in some complex percutaneous cardiac interventions must encourage interventional cardiologist to develop radiation dose reduction protocols, radiation protection training programs and to perform an adequate follow-up of the p who undergo this procedures.

TCT-608

Plasma Levels of Haptoglobin is Elevated in Patients With Coronary Artery Disease

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Background: Inflammation is a major driving force underlying the initiation and unstable progression of coronary plaques. Haptoglobin (Hp) is a genetically determined acute phase protein, the synthesis of which is increased during inflammation. The aim of this study was to investigate both phenotype and plasma levels of Hp in patients with and without significant coronary artery disease (CAD)

Methods: We recruited 83 subjects with luminal stenosis ≦40% in coronary angiogram and normal ejection fraction with normal regional wall motion in left ventriculogram as control group and 360 patients with luminal stenosis ≧70% as CAD group. Plasma Hp levels were determined using phenotype-specific enzyme-linked immunosorbent assay, while Hp phenotype was determined by native polyacrylamide gel electrophoresis.

Results: The plasma Hp concentrations were significantly elevated in CAD patients than the controls (262.5±144.0 vs 176.0±86.7 ng/ml; p=0.000). In CAD patients, Hp concentrations were significant higher in subjects with the 2-1 and 2-2 phenotypes. Although statistically insignificant, plasma Hp concentration was higher in CAD patients with previous MI (276.6±162.2 vs 253.1±130.0 ng/ml; p=0.148). In stepwise multivariate logistic regression analysis, HTN (p=0.001), DM (p=0.01), LDL-choleterol level (p=0.008), and Hp concentration (p=0.000) were independently associated with CAD. In addition, Hp concentration correlated well with the stenosis severity of the vessel (r=0.235, p=0.000).

Conclusion: Our findings suggest that plasma concentration of Hp is significantly elevated in patients with CAD, particularly those with the Hp 2-1 and 2-2 phenotypes.

TCT-609

Safety and Feasibility of the Magnetic Positioning System (gMPS™) for Percutaneous Coronary Intervention

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Background: 2D X-ray fluoroscopy of 3D coronary anatomy is limited by vessel overlap and foreshortening, which may lead to sub-optimal stent selection and positioning which increases risks of restenosis, and causes exposure to radiation and radio-contrast. Systems using weak magnetic fields and radiofrequency for localisation without relying on X-ray have dramatically reduced radiation and contrast exposure during electophysiological procedures. These benefits are also needed in coronary angioplasty. We quantitatively assessed the gMPS™ (Mediguide, Haifa, Israel) for the accuracy of both the 3D length measurement and the virtual land mark (VLM) with cardiorespiratory motion compensation.

Methods: The gMPS magnetic transmitter is enclosed around the X-ray image intensifier. The guided measurement catheter (GMC) is equipped with a passive gMPS™ sensor. The steps were: 1) target vessel reconstruction, 2) length measurement between 2 side branches on the working angiographic view 3) length measurement of markers of a marker Guire wire (GW) 4) measurement of stenosis length 5) positioning a VLM to guide stent implantation.

Results: 2D QCA when compared to gMPS 3D reconstruction significantly underestimated the lengths of the region of interest (74.1mm [59,8-96,3] vs 86.2mm [79.7-105.8], p=0.02) and stenosis lengths (13,3mm [10,8-16,1] vs 16,1mm [14,3-18,2], p=0.02).The error of measurement was also greater when using 2D QCA for measurement in comparison to Mediguide 3D. Vessel foreshortening on 2D QCA when compared to 3D reconstruction was median 37% [22-46]. In all but 3 of 13 cases (77%) foreshortening was >20%. A stent was positioned with the aid of the VLM in a subgroup of 5 patients . The difference between the stent position obtained with the help of the VLM and the desired stent position was median 3,0mm [1,8-4,3] as verified with contrast angiography.

Conclusion: Use of the gMPS™ to facilitate PCI is safe, feasible and allows accurate measurement length without foreshortening with potential reduction in radiation and contrast use.

TCT-610

What is the Likelihood That an Individual Who Has a Normal Coronary Angiogram After the Age Of 40 Will Develop Significant Coronary Artery Disease?

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Background: Atherosclerosis of the coronary arteries begins in the teenage years with slow progression over a period of decades. The lack of angiographically apparent coronary artery disease (CAD) in older individuals would suggest that they are at low risk for the subsequent development of significant CAD. To test this hypothesis, we studied the prognostic value of a “normal” coronary angiogram in individuals older than 40 years of age.

Methods: Patients older than 40 years who had at least two coronary angiograms between January 1, 1990 and March 31, 2011, in which the first angiogram showed no evidence of coronary atherosclerosis and who had not undergone heart transplantation were identified.

Results: There were 205 patients included in the study with a median age [25%,75%] of 52 [47,59] years. There were 66% females, 44% with diabetes, 31% who were current smokers and 85% with hypertension. Subsequent coronary angiography showed no evidence of CAD in 149 (73 %; CAD - group) and angiographically apparent disease in 56 (27%; CAD + group) with the median maximal stenosis in the CAD + group being 30% [20,40]. There was no difference in gender, BMI, presence of diabetes or smoking history between CAD – and CAD + patients, however the CAD + group were older at initial angiogram (55 [48,63] vs 51 [46,58] years; p = 0.03) and had a longer time between angiograms (75 [39,132] vs 61 [31,98] months; p = 0.03). There was no difference in the development of non-STEMI (8.9% vs 6.7%; p = ns) or STEMI (1.8% vs 1.3%; p = ns) but hyperlipidemia was more common in CAD+ group (75% vs 55%; p=0.0004).

Conclusion: During a mean time span of 76 ± 46 months between angiograms, 27% of patients in this study developed angiographically apparent CAD and 3% required revascularization. Thus the majority of patients with a normal coronary angiogram after 40 years of age do not develop CAD and only rare patients develop a hemodynamically significant lesion.

TCT-611

Radiation Exposure and Diagnostic Efficacy in Dual-Axis Rotational Coronary Angiography vs. Standard Coronary Angiography

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Background: Standard coronary angiography (SA) remains the gold standard diagnostic modality for the assessment of coronary stenosis at the cathlab; however, new angiographic imaging techniques associated with less contrast and radiation exposure are currently under investigation. Dual-axis rotational coronary angiography (DARCA) captures simultaneous images (LAO/RAO and cranial/caudal gantry movement) during one cine acquisition. Objective: determine 1) safety and 2) diagnostic performance of DARCA compared to SA.

Methods: Forty-four patients underwent SA followed by DARCA. Contrast volume and radiation exposure to patient were recorded for each method. All angiograms were reviewed for CAD screening by an expert interventional cardiologist (OB1) and by an interventional fellow (OB2) to evaluate whether agreement between imaging modalities were dependent on observer level of experience. Angiographic data were collected on a dedicated database: number of lesions (L) percentage diameter stenosis (DS) and vessel size (VS). To prevent reading biases, each observer first read all DARCA angiographies and 15 days later read SA.

Results: Compared to SA, DARCA was associated with a 45.4% reduction in contrast volume (33,29±11,2ml VS. 17±5,4ml p <0,01). Radiation was also reduced to 65,4% (SA: 235,6±76,8mGy VS. DARCA: 82,7±46,6mGy p <0,01) . Between observers, L and DS had a strong correlation either by DARCA (r=0.86 and r=0.71, respectively) or by SA (r=0.78 and r=0.75, respectively).

	OB 1	OB 1		OB 2	OB 2	
	SA	DARCA	Delta/Correlation	SA	DARCA	Delta/Correlation
L	2±0.9	1.9±1	0(0 to 0.25)/r=0.70	2.2±1.1	1.8±1.1	0 (0 to 1)/r=0.8
VS (mm)	2.92±0.45	2.95±0,66	0(-0.3 to 0.5)/r=0.77	2.8	2.8±1.3	0 (-5 to 5)/r=0.76
DS (%)	73±17	72±17	0(-5 to 0)/r=0.77	73±16	75±18	0 (0 to 5)/R=0.87

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